TVA-MP-C10

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Public Works (1910) Department.

18×28 = 2 per sheet

(1)

G.O., No. 118-9 I

DATED 19.4. 1910.

(47)

23-8-?

[Despatch Abstract.]

Widening and deepening the Watershed Cutting from the Periyar lake at Thekadi, Madura Dt.

Approving the revised estimate amounting to Rs 2,51,289, including establishment charges, for ___ and ordering that the estimate be forwarded to the Govt. of India for sanction.

Letter to the Govt. of India Rd.

J. Indx. / Dr.

Indexed.

19/4

G.O.	No.	Department.

பாதுகாப்பு பிரிவு-1

செப்பனிடுபவர் பெயர் : R. [illegible]வேல்

செப்பனிடுவதற்காக எடுத்துக் கொள்ளப்பட்ட நாள். - 01/2011 - 01/2011

11/1/11.		
சரிபார்க்கும் முதல் முறிபாள கையொப்பம்	சரிபார்க்கும் 2ம் முறிபாள கையொப்பம்	ஆராய்ச்சி உதவியாளர் கையொப்பம்

Government of Madras.

PUBLIC WORKS DEPARTMENT.

IRRIGATION.
ACCOUNT.

Recd. 1910. *Enclosures*

Regd. *Spare copies*

G.O., No. 118 I., 19th April 1910.

Widening and deepening the water-shed cutting from the Periyar lake at Thekkadi, Madura District

Approving the revised estimate, amounting to Rs. 2,51,289, including establishment charges, for — and ordering that the estimate be forwarded to the Government of India for sanction.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Irrigation.
Account.

Read—the following papers :—

I

G.O., No. 119 I., dated 12th March 1907.

II

Letter—from H. E. Clerk, Esq., Superintending Engineer, VI Circle.
To—the Chief Engineer for Irrigation.
Dated—Trichinopoly, the 23rd January 1909.
No.—73 C.E.

I have the honour to forward herewith a copy of Camp No. 4, dated 19th January 1909, from the Executive Engineer, Madura division, in which he shows the rates he proposes to pay Messrs. Mitchell & Hockin for widening the watershed cutting in the Periyár lake. It will be seen that the rates proposed are largely in excess of those in the estimate, but as the Executive Engineer states that he could not get the work done at all without raising these rates very considerably and as he does not anticipate a large excess on the estimate, I consider it advisable to entrust the work to Mr. Hockin. I have therefore approved his proposals and have directed him to submit as soon as possible a revised estimate based on the rates paid for work already done and those to be paid in future, and also on the most accurate forecast possible of the work remaining to be done.

Enclosures.

Letter—from A. R. deChazal, Esq., Executive Engineer, Madura division.
To—the Superintending Engineer, VI Circle.
Dated—the 19th January 1909.
No.—Camp 4.

I have the honour to enclose a copy of the abstract of the estimate for widening and deepening the watershed cutting at Tekkadi, Rs. 90,000. (The portion relating to the straightening of the tunnel has been omitted from it.)

2. I also enclose a copy of a statement showing the quantity of work done up to date and its value. The rate given in that statement shows the average rate of the earth work as Rs. 4–2–6 per 1,000 c. ft. There is some mistake in this as no rate less than Rs. 5 was paid when the work was done.

3. I also enclose a copy of the rates which Messrs. Mitchell & Hockin of Coolasagram, South Travancore, agree to work for. These rates are much higher than the estimated rates. Messrs. Mitchell & Hockin's representative went to Tekkadi and to the Cumbum valley, interviewed several local piece-workers, and working men, and told me that they could not work at lower rates than those which he gave me.

4. Two years ago when I did part of the excavation of the watershed cutting, I got a good many piece-workers; they accepted the estimate rates, but all complained that they had lost money. I would not raise their rates and closed all their accounts. Last hot weather, we did a little rock-blasting at the north end or mouth of the tunnel in the cutting between the mouth of the tunnel and the measuring weir. None of the piece-workers of Kumili would take up any work, and several asked for much higher rates than even the ones which Messrs. Mitchell & Hockin ask for now.

5. From what I have seen of the watershed cutting I believe that the proportion of hard rock and of soft rock has been overestimated and that there is a much greater proportion of earth in the cutting than the estimate shows. Even with these higher rates it is probable that the original estimate will not be exceeded by much.

Even if the estimate is exceeded, there is, I believe, no other way of getting the work done than by getting an outside contractor to take it up. If I gave in to the local piece-workers they would ask for much higher rates and if I got the work done by daily paid coolies, it would cost me much more.

I have no European Assistant Engineer to supervise the work, if it were done by daily paid coolies.

6. I have told Messrs. Mitchell & Hockin's representative that if the head of his firm accepted the rates which he proposed, I would make an agreement with him, and that the firm could then arrange to start the work at once. The closure of the tunnel will have to be made soon after the first week of February.

If you do not approve of my signing an agreement with Messrs. Mitchell & Hockin, I request that you will be good enough to let me know by wire at once.

Estimate Form—Abstract.

Quantity.	Description of work.	Rate.	Per	Amount.	Total.
1	2	3	4	5	6
	Widening and deepening the watershed cutting of the Periyár lake.	RS.		RS.	
76,000 c. ft.	Excavation in hard earth	5	1,000 c. ft.	3,380	
301,000 ,,	Do. in gravel and boulders	10	Do.	3,010	
694,000 ,,	Do. in soft rock	35	Do.	24,290	
521,000 ,,	Do. in hard rock	90	Do.	46,890	
60,000 ,,	Removing the existing revetment and stacking the materials	2	100 c. ft.	1,200	
	Charges for ring bund, baling & unforeseen works.	L.S.	..	3,590	
	Contingencies	..	..	5,895	
	Petty supervision	..	..	2,245	
	Total ..	..	..	90,000	
	Grand total of estimate ..	..	..	..	90,000

Watershed cutting at Tekkadi.

The rates which I am prepared to give for the excavation are—

	RS.
(1) Hard rock	125 per 1,000 c. ft.
(2) Soft rock	50 ,, 1,000 ,,
(3) Gravel	15 ,, 1,000 ,,
(4) Earth including silt in the channel	8 ,, 1,000 ,,

(*plus* As. 3–1 for every yard lift above 2 yards and As. 3–1 for every 10 yards lead above 20 yards lead).

I agree to place derricks as many as I have at Periyár wherever you want and give your bamboos on the side of the cutting, to lay the tramway line and to keep it working, as far as possible, to build cooly lines—all at the cost of the Government.

Works done up to end of November 1908 in the watershed cutting.

Quantity.	Description.	Rate.	Amount spent.
		RS. A. P.	RS. A. P.
209,053	Hard earth	4 2 6	869 5 8
60,048	Gravel and boulders	10 0 0	600 7 8
24,860	Soft rock	35 0 0	870 1 6
237,186	Hark rock	90 13 2	21,525 12 9
	Total ..	,,	23,865 11 7

III

Memorandum No. 399, dated 4th February 1909.

The Chief Engineer for Irrigation has the honour to state that the action of the Superintending Engineer, VI Circle, in sanctioning the proposals of the Executive Engineer, Madura Division, to entrust the work of widening and deepening the watershed cutting of the Periyár lake to Messrs. Mitchell & Hawkin, is approved; but the Superintending Engineer is requested to send to this office for information when sending the contract the data for the original rates and also for those to be paid to the contractors in question, showing clearly the initial rates and lead and lift in both cases.

C. A. SMITH,
Chief Engineer for Irrigation.

To the Superintending Engineer, VI Circle.

IV

R.C. No. 3324, dated 22nd December 1909.

The undersigned has the honour to invite the attention of the Superintending Engineer, VI Circle, to this office Memorandum No. 399, dated 4th February 1909, regarding the revised estimate for widening and deepening the watershed cutting of the Periyár lake and to request him to expedite the submission of the revised estimate together with the data for the rates referred to.

2. In the B.F.P. report of this work for October the Executive Engineer, Madura Division, stated that the revised estimate for the work was submitted to the Superintending Engineer with his No. 1061/S.E., dated 23rd October 1909. The Superintending Engineer is requested to submit the same at a very early date.

(By Order.)

J. M. LACEY,
Asst. Chief Engineer for Irrigation.

To the Superintending Engineer, VI Circle.

V

Letter—from H. E. CLERK, Esq., Superintending Engineer, VI Circle.
To—the Chief Engineer for Irrigation.
Dated—Trichinopoly, the 19th January 1910.
No.—68 C.E.

With reference to the correspondence ending with your R.O.C. No. 3324, dated 22nd December 1909, I have the honour to forward herewith, for your approval and sanction of Government, a revised estimate, amounting to Rs. 2,03,800, for widening and deepening the watershed cutting of the Periyár lake.

2. The necessity for the revision has already been explained in my notes of inspection of the head works during June 1909 and has been accepted by you in your Dis. No 18-O., dated 21st July 1909, and is also now clearly explained in the report attached to the revised estimate.

3. The excess of Rs. 1,03,800 over the original estimate sanctioned in G.O., No. 119 I., dated 12th March 1907, is mostly due to the following causes:—

(1) the rates provided in the sanctioned estimate being found inadequate during execution;

(2) wrong classification of the nature of the soil;

(3) excess of 294 units in quantity of excavation;

(4) the provision made in the sanctioned estimate for the formation of ring bund, baling, etc., being found quite inadequate to meet the actual requirements. This was largely due to the unexpected cyclonic rainfall in May last which breached the ring bund as described in my inspection notes above quoted;

(5) no provision having been made in the original estimate for the following items which were found necessary:—

(*a*) sheds and cooly lines;

(*b*) depreciation value included in this estimate for the tramway lines obtained for the quick removal of the blasted stuff;

(*c*) unforeseen charges which may probably be found necessary during execution of work which still remains to be done.

The excess may be distributed as follows:—

Excess under items.	On work done already.	Work to be done.
	RS.	RS.
(*a*) Widening and deepening the watershed cutting ...	15,095	66,072
(*b*) Charges for ring bund, baling, etc.	1,998	...
Ring bund	...	5,000
Baling	...	2,000
(*c*) Sheds and cooly lines	3,713	2,000
(*d*) Depreciation value of tram value line	4,000	...
(*e*) Unforeseen works	...	4,000
(*f*) Contingencies and petty supervision	..	156
(*g*) Blocking up the curved passage	...	176
Total ...	24,806	79,404
Total excess ...		24,806
		1,04,210
Deduct savings under—		
(*a*) Removing the existing revetment and stocking materials ...		410
Total savings ...		410
Net excess to be sanctioned ...		1,03,800

4. Fresh levels have been taken showing the work still remaining to be done. These sections together with the sanctioned level sections are herein enclosed for reference.

It is requested that early sanction to the revised estimate may be accorded.

ENCLOSURES.

Report to accompany revised estimate for widening and deepening the water-shed cutting at Thekkady.

	RS.
Amount of original estimate	1,00,000
" revised "	2,03,800
Net excess ...	1,03,800 or 103 per cent.

In G.O., No. 119 I., dated 12th March 1907, an estimate was sanctioned amounting to Rs. 1,00,000 for widening and deepening the water-shed cutting at Thekkady, and the reports printed in G.O., No. 1200 I., dated 22nd December 1906, explain the necessity and scope of the estimate.

2. Work was started in March 1907, and the expenditure during the working season of that year amounted to Rs. 7,582. During the working season of April and May 1907, the expenditure amounted to Rs. 22,026. No work was done during the working season of 1908, as the water level in lake did not go below + 138·80 that year. The necessity for the enhanced rates was anticipated in January 1909, and the Superintending Engineer, in his No. 259, dated 21st January 1909, having approved of the rates tendered for by Messrs. Mitchell & Hockin, this revised estimate was called for (*vide* correspondence ending with Superintending Engineer's No. 643, dated 11th February 1909, on Irrigation Chief Engineer's Memorandum, No. 399, dated 4th February 1909). Work was accordingly resumed in 1909, the tunnel was closed in February, and excavation started on the 29th February 1909. It was then found that there were a great many boulders and fragments of rock in the cutting near the head sluice, and these had to be removed. Work progressed until early in May, and a channel has been cut for the entire length varying from 25 feet to 34 feet in width and on an average 5 feet below the depth left at the end of May 1907. There are however a good many "thundas" here and there, which will obstruct free flow and will cause a certain amount of silting up. The removal of these obstructions and the deepening of the entire length by about 3 feet and widening the same to the full width of 35 feet remain to be done, and these are proposed to be carried out during the next working season, 1910.

The operations of the season have been singulary unfortunate. In the first place it was necessary to keep the head sluice open longer in February than would otherwise have been done; and then, there was a cyclone of severity unprecedented since 1877 in what should have been the middle of the working season; and finally all attempts to repair the damages were frustrated by severe and early commencement of the south-west monsoon. For these reasons all attempts to complete the work proved ineffective.

3. The different items of excess and the reasons therefor have been explained in detail in the comparative statement annexed. For various reasons, it was found necessary to compile the estimate as has now been done, taking actuals already done and estimating the details yet to be done. The chief reasons of excess are :—

(1) The rates sanctioned were far below the actuals that had to be paid to Messrs. Mitchell & Hockin who did the major portion of the work. The authority for payment at actual rates paid was sanctioned in Superintending Engineer's No. 259, dated 21st January 1909. The following shows the sanctioned rate and the actuals paid—

	Sanctioned rate.	Actually paid.
	RS.	RS.
Earthwork	5 per unit	8
Gravel	10 "	15
Soft rock	35 "	50
Hard rock	90 "	125

The actuals paid were arrived at from actual observation and note of labour employed during the progress of the work.

(2) The original estimate contained classifications in soil, which were found to be absolutely incorrect during construction—*vide* statement attached.

(3) Another cause of excess was occasioned by the side slope of 1/8 : 1 that had to be given to the excavation though the original estimate provided only vertical sides for this excavation.

(4) Considerable excess costing over Rs. 5,711 was caused in items "unforeseen," such as ring bunds, baling sheds, etc. These were all unavoidable and could not have been correctly foreseen.

(5) An amount of Rs. 4,000 due to charges on account of depreciation against value of tram-line and waggons etc., obtained from Kistna Eastern and Nellore divisions of the II Circle, has also been included in the estimate. These were obtained through the Superintending Engineer, VI Circle, as they were found necessary for the quick removal of the "blasted stuff."

(6) Provision for unforeseen items amounting to Rs. 13,000 for ringbund, sheds, baling, etc., to be expended during the next working season to complete the work, has also been made in the estimate and these figures show the probable amount, judging from previous experience.

The work done so far, was done in a businesslike manner, and there was no waste of labour or money that could possibly have been avoided. I request the early sanction of this revised estimate.

21*st October* 1909.

M. BROWN,
Executive Engineer, Madura Division.

Estimate Form—Comparative statement of differences.

Description of work.	Original estimate.			Revised estimate.			More.	Less.	Explanation of differences.
	Quantity.	Rate.	Amount.	Quantity.	Rate.	Amount.			
1	2	3	4	5	6	7	8	9	10
Water shed cutting—Revised estimate for widening and deepening of the—.		RS. A. P.	RS.		RS. A. P.	RS.	RS.	RS.	
1. Excavation in hard earth ..	6,76,000	5 0 0 per 1,000 c. ft	3,380	4,53,867	6 13 2	3,096	..	284	Items 1 to 4 show work done up to 20th June 1909. The quantities entered in these 4 items are the actuals and the rates deduced from the actual expenditure incurred. These differ from the increased agreement rates sanctioned in Superintending Engineer's memorandum No. 259, dated 21st January 1909, in favour of Messrs. Mitchell and Hockin, because the work done by various agencies previous to February 1909 has been also incorporated in them—*vide* report for the increased rates sanctioned by Superintending Engineer, ending with Superintending Engineer's No. 643, dated 11th February 1909.
2. Do. gravel and boulders ..	3,01,000	10 0 0	3,010	2,47,150	10 15 3	2,707	..	303	
3. Do. soft rock	6,94,000	35 0 0	24,290	2,58,873	51 15 7	13,455	..	10,835	
4. Do. hard rock	5,21,000	90 0 0	46,890	6,52,203	112 8 10	73,407	26,517	..	
5. Do. do.	..	..	..	4,39,000	125 0 0	54,875	54,875	..	Items 5 to 7 represent work yet to be done after 20th June 1909. The detail quantities have been given for these, and they are calculated from fresh level sections accompanying. The rates are the ones approved by Superintending Engineer in his No. 259, dated 21st January 1909, for Messrs. Mitchell and Hockin. Data sheets accompany the rates.
6. Do. in soft rock	..	..	..	61,500	50 0 0	3,075	3,075	..	
7. Do. in earth, slush gravel, soft rock mixed.	..	..	..	3,79,000	22 12 0	8,622	8,622	..	
8. Removing the existing revetment and stacking materials.	60,000	2 0 0 per 100 c. ft.	1,200	1,36,571	0 9 3	790	..	410	This is as per actual work done.
9. Charges for ring bund baling and unforeseen works.	Lump sum.	..	3,590	..	..	5,588	1,998	..	Expenditure up to end of August 1909 as per actuals spent and accounted for in the register of works.
10. Ring bund	..	..	..	..	..	5,000	5,000	..	This item is for work to be done during next closure in 1910.
11. Sheds	..	..	..	..	..	{ 3,713 2,000 }	5,713	..	This item was omitted in the original estimate: the above figure is the actual expenditure up to June 1909, and Rs. 2,000 is the probable amount for completing the work.
12. Baling charges	..	..	..	Coolies 4,000	0 8 0 per cooly.	2,000	2,000	..	} This will be necessary for work still to be done during the closure of 1910.
13. Unforeseen works, such as, slush removal, etc., before commencing work during the closure of 1910.	..	..	..	..	..	4,000	4,000	..	
14. Tram line	..	..	..	..	..	4,000	4,000	..	The tram lines and waggons were obtained from Kistna Eastern division and from Nellore division of II Circle, through the Superintending Engineer, VI Circle—*vide* this office No. 740 S.E., dated 3rd September 1908, and also Superintending Engineer's No. 3670, dated 3/10th September 1908. The total cost of the tram lines and waggons comes to Rs. 10,658. The cost debitable to works will be at 12½ per cent. for depreciation for one year. I am of opinion that they are useless. The Contractor Messrs. Mitchell & Hockin * not only found them such, but greatly in the way. They are now below water level of the lake, and orders are requested if they should be kept at Thekkady or sent to Madura.
15. Contingencies	..	..	5,395	..	..	5,400	5	..	
16. Petty supervision	..	..	2,245	..	..	2,396	151	..	
Total ..	..	..	90,000	..	..	1,94,124	1,15,956	11,832	

* Remarks by the Superintending Engineer—
These have been ordered to be removed and kept in stock at Tekkadi until it is decided where they are likely to be required.

H. E. CLERK,
Superintending Engineer, VI Circle.

Estimate Form—Comparative statement of differences—cont.

Description of work.	Original estimate.			Revised estimate.			More.	Less.	Explanation of difference.
	Quantity.	Rate.	Amount.	Quantity.	Rate.	Amount.			
1	2	3	4	5	6	7	8	9	10
Blocking up the curved passages and driving a head through the island in the tunnel leading from the Periyár lake.			RS.			RS.	RS.	RS.	
17. Blocking up the curved passages, etc.	..	..	10,000	..	..	10,176	176	..	The amount is the actual expenditure as per register of works, and the work is nearly completed and hence no details are given.
Grand total ..	..	..	1,00,000	..	..	2,04,300	1,16,132	11,832	
Deduct— Amount sanctioned in G.O., No. 1200 I., dated 22nd December 1906, and Circle Register No. 376 of 1906-1907.	..	..	..	..	..	1,00,000	11,832	..	
Net amount requiring sanction ..	..	..	..	..	..	1,04,300	1,04,300	..	

Rupees one lakh and four thousand three hundred only.

21st October 1909.

M. BROWN,
Executive Engineer, Madura Division.

VI

Note by the Chief Engineer for Irrigation, dated 9th April 1910.

In G.O., No. 119 I., dated 12th March 1907, an estimate, amounting to Rupees 1,00,000 for works, or Rs. 1,23,000 including establishment, for widening and deepening the water shed cutting from the Periyár lake at Tekkadi was sanctioned, and work to the value of about Rs. 24,000 was executed during 1908–1909.

2. In his letter No. 73-C.E., dated 23rd January 1909, the Superintending Engineer, VI Circle, brought to the notice of the Chief Engineer for Irrigation that the Executive Engineer, Madura Division, reported that the work could not be done at all without raising the rates considerably and that he recommended that the work be entrusted to Messrs. Mitchell and Hockin of Coolasagaram of South Travancore, who agreed to undertake it at certain rates at which even the local piece-workers were not prepared to do it, but demanded still higher rates. The Superintending Engineer further reported that he approved of the Executive Engineer's proposal as it was considered advisable to entrust the work to the above firm. The Superintending Engineer's action was accordingly approved and a revised estimate called for in this office Memorandum No. 399, dated 4th February 1909.

3. With his letter No. 68-C.E., dated 19th January 1910, the Superintending Engineer now submits a revised estimate, amounting to Rs. 2,03,800, for the work showing an excess of Rs. 1,03,800 over the original estimate for "works".

4. The difference between the original and revised estimates, as ascertained from the comparative statement, is shown below by sub-heads :—

—	Original.	Revised.	Difference.
	RS.	RS.	RS.
1. Widening and deepening the water shed cutting	77,570	1,58.737	+ 81,167
2. Ring bund, baling and unforeseen works	3,590	16,588	+ 12,998
3. Sheds for workmen, etc.	..	5,713	+ 5,713
4. Blocking up the curved passages	10,000	10,176	+ 176
5. Depreciation valve of tram line	..	4,000	+ 4,000
6. Contingencies and supervision	7,640	7,796	+ 156
7. Removing the existing revetment and stacking	1,200	790	— 410
Total ..	1,00,000	2,03,800	1,03,800

Of the excess of Rs. 81,167 under item No. 1, a sum of Rs. 25,144 is due to wrong classification of the nature of soils when the original estimate was framed; Rs. 20,073 is due to extra cutting found necessary on account of the differences found in the levels of the water shed cutting originally taken when compared with those taken just before the work was started, and Rs. 35,950 is due to increase in rates.

Excess under item No. 2 is due to the lump sum provision made for baling, ring bund, etc., in the sanctioned estimate being found quite inadequate to meet the actual requirements on account of the damages caused by the unexpected cyclonic rainfall in May 1909.

Excess under item No. 3 is due to provision made for sheds and cooly lines which were omitted in the sanctioned estimate having been found necessary in the course of the execution of the work.

Excess under item No. 5 is due to payment of the depreciation value to the extent of Rs. 4,000 for the tramway lines and waggons obtained from the Kistna Eastern and Nellore Divisions for the quick removal of the blasted stuff.

The difference in the remaining items call for no special remarks.

Difference in levels. It may be noted that as the bottom and sides of the cutting are very rough, it is difficult to take accurate levels and that part of the difference is also due to spoil and debris having fallen into the cutting since the original levels were taken.

Difference in classification of soils.—Owing to the very variable nature of the sub-soil of the cutting, it was difficult to make a correct classification of the soils beforehand.

Increase in rates.—The price of labour has gone up considerably in recent years and the increase now provided appears to have been unavoidable. The amount of the revised estimate has been increased in this office from Rs. 2,03,800 to Rs. 2,04,300 for "works" owing to errors found in the calculation of cutting and widening. In spite of the large excess, however, the work is still quite worth executing and the revised estimate, as altered in this office, is therefore recommended for sanction.

5. As the water has fallen sufficiently low in the lake, arrangements have been made to go on with the work in anticipation of sanction to the revised estimate and it will, it is hoped, be fully completed during the current working season.

C. A. Smith,
Chief Engineer for Irrigation.

Order—No. 118 I., dated 19th April 1910.

The revised estimate, amounting to Rs. 2,04,300, for works or Rs. 2,51,289 including the charge for establishment for widening and deepening the Periyár water-shed cutting is approved and will be forwarded to the Government of India for sanction.

2. The following letter will be sent to the Government of India.

[Here enter No. 119 I., dated 19th April 1910.]

(True Extract.)

C. A. Smith,
Joint Secretary to Government, P.W.D.,
Irrigation Branch.

To the Chief Engineer for Irrigation.
,, Superintending Engineer, VI Circle.
,, Examiner, Public Works Accounts.

Forwarded to the

(By Order.)

Deputy Registrar.

7

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Irrigation.
Account.

No. 119 I.

LETTER—from

THE HON'BLE MR. C. A. SMITH,
Joint Secretary to the Government of Madras,
Public Works Department
(Irrigation Branch),

To

THE SECRETARY TO THE GOVERNMENT OF INDIA,
PUBLIC WORKS DEPARTMENT.

SIR,

I am directed to forward herewith a copy of the Proceedings of this Government, No. 118 I., dated 19th April 1910, together with the revised plans and estimate, amounting to Rs. 2,51,289, including the charge for establishment for widening and deepening the Periyár water-shed cutting, and to request that the Government of India may be pleased to accord their early sanction to the estimate.

I have the honour to be,
Sir,
Your most obedient servant,

Joint Secretary to Government, P.W.D.,
Irrigation Branch.

OOTACAMUND,
19th April 1910.

Documents accompanying—
Copy of the Proceedings referred to.
Plans and estimate.

Data sheet to accompany the Revised Estimate for widening and deepening Water shed cutting:- at Tekkadi:

Amount of Revised Estimate Rs. 2,~~05,000~~ 3 800.

Serial No.	Particulars of work done	No. of coolies employed per unit	Rate per Cooly			Amount			Remarks.
1	Excavation in Hard Earth	16	0	8	0	8	0	0	These Rates are based on the ordinary
2	Do Gravel & Boulder	30	0	8	0	15	0	0	Data quantities of the Department but
3	Do Soft Rock	100	0	8	0	50	0	0	on an 0/8/0 Cooly basis sanctioned for
4	Do ~~Hard~~ Do	250	0	8	0	125	0	0	these tracts by the S. E in No. 259 of 21.1.09.

N. B

No ~~a~~ data ~~statement~~ accompanied the original estimate sanctioned in G. O. No. 1200 I of 22-12-06

8 F

M. Brown 21/10/09
Executive Engineer
Madura Division

JSB 21/10/09. SRM 21.10.09 [initials] 21.X.09

Water shed Cutting at Thekkadi.

Statement showing the classification of soil as originally sanctioned in G.O. No 119.I D/ 12-3-07 as compared with actuals; as per this Revised Estimate.

Cross section in the Original Longl. sectn. and Distances.	Classification of soil for which the original estimate has been framed & sanctioned.	Distances as per Longl. section now taken.	Classification of soil as met with during actual execution of the work	Remarks.
Sill of H.R. Sluice to C.S. 20 or 2000 ft	Hard Rock. (600	Sill of H.R. Sluice to 600' + (600' to 2050') SOD	Silt quarry rubbish big boulders on top & Rock below Hard Rock	N.B.
C.S. 20 to C.S. 17. 600'	Soft Rock	2050' to 2350' 2350 to 2600'	1/4 Hard Rock & 3/4 Soft Rock. 2/3 ... Do & 1/3 Do	These classifications are clearly
C.S. 17 to C.S. 16, = 200'	Soft Rock	2600 to 3100	3/4 Hard Rock & 1/4 Soft Rock.	
C.S. 16 to C.S. 15, = 200'	Boulders with Gravel	..	..	shown in the
C.S. 15 to C.S. 10 = 1400' 3100 1500 4600	Soft Rock	3,100 to 3,570 3,570 to 4,660	1/4 Hard Rock & 3/4 Soft Rock Hard Rock	cross sections, levels accompanying.
C.S. 10 to C.S. 8, = 400' 4600	Gravel	4,660 to 4,900	Slush & Hard Rock	
C.S. 8 to Starting point in lake 0 = 1600' 6400	Hard ~~Rock~~ Earth SOD	4900 to 6250	Slush, Earth, Gravel & Soft Rock mixed.	

M. Brown
21.10.07.
Executive - Engineer
Madura - Division

JBB 21.10.09.   SOD 21.10.09   B 21-X-09

10

Agreement No. 11 5/2/09.

Authority—G.Os., No. 2332 W., dated 28th August 1902, No. 1617 W., dated 5th June 1903, No. 640 W., dated 25th February 1904, and No. 1782 W., dated 13th June 1904.

P.W.D. Form No. K—2.

(*Madras Form No. M 169.*)

N.B.—Piece-work is that which involves a payment for work done at a stipulated rate only, without reference to a total quantity or time.

TENDER AND AGREEMENT FOR PIECE-WORK.

Tender and Conditions.

P.W.D. Form No. K—2.

No. ______________ of 190

TENDER FOR PIECE-WORK.

(Mitchell and Moothu of Colasaparam South Travancore.)

(We) do hereby tender to execute works of the undermentioned description by piece-work, and in accordance with the conditions noted below in consideration of payment being made, for the quantity of work executed at the respective rates specified in the following schedule:—

SCHEDULE.

Name of work.	Number of item.	Class and description of work to be executed.	Unit of calculation.	Rate of payment. RS.	A.	P.
Widening and deepening the water shed cutting - Periyar lake. Estimate Rs-90,000 ——	1	Excavation in hard Earth with an initial lead of 20 yds and lift 2 yards.	1000 Cft	8	—	—
		For every additional lead of 10 yds or lift of 1 yard.	— Do —	—	3	1
	2	Excavation in Gravel and Boulders up to one cubic foot including lead & lift	— Do —	15	"	"
	3	Excavation in soft Rock including lead and lift	— Do —	50	"	"
	4	Excavation in hard rock including lead & lift —	— Do —	125	"	"
		Note.				
		(1) Baling to be paid on daily labour rate 8 annas per day per man				
		(2) If any Stacks of dry Stone have to be removed by the Contractor they will be paid at the rate of Rs 0-10 per 1000 Cft up to a distance of 50 feet measured in the Stack before removing. This applies to Stacks which are lying on the bank at present.				
		(3) Explosives will be supplied at Cost price and will be deducted from the Contractor's Bill.				
		(4) Payment will be made once a fortnight.				
		(5) Bamboos for Scaffolding will be supplied to the Contractor at the site of the channel				
		(6) Cooly lines will be supplied free to the Contractor.				
		(7) If it is necessary to remove any excavated material other than Rock further than 50 feet beyond the edge of the Cutting, the Contractors ↘				

P.T.O ————→

313/5/3

19 11

(6) The Contractor further agrees that no work will be paid for unless thoroughly good and fully in accordance with the Specification and should through inadvertance bad work be passed and paid for, it will nevertheless be perfectly competent for the said Division officer or other officer to strike the same out of the account at any future time and recover the value at any date previous to or at the time of granting the final certificate.

(7)

Should the said Division officer or other officer consider that work although not executed in strict accordance with the specification may be allowed to stand, he is empowered to pay for the same at such reduced rate as he may fix — but this proceeding is quite optional on his part.

(Sd) R. Dechazel.

(Initialled) [illegible]
2/2/09.

[illegible] 18/11/09.

(7) Contractors will be paid for it at the same rate as specified for extra lead and lift in Earthwork.

(8) Rate for Gravel, Soft Rock and hard Rock to include lead and lift as noted above.

(9) Probable date of Commencement of work would be 15th February 1909 and probable date of cessation 15th June 1909.

(Signed) M.H.
2/2/09.

T.S.K.
18/2/09.

13

P.W.D. Form No. K—2.

CONDITIONS.

1. The work is to be carried on with due diligence, and all work executed is to be done in a workman-like manner. The material used, when supplied by the party tendering, to be of the best of the several kinds procurable, and in all cases is to be subject to the approval of the Officer in charge of the Madura Division, Public Works Department, for the time being, hereinafter called the Division officer, or any officer of the Public Works Department of the Government of Madras duly authorised in this behalf by such Division officer, whose decision as to the rate of progress and the quality of work or material shall be final.

fortnight. SBD 2. The quantity of work executed shall be measured and payments made at least once a ~~month~~, and on the completion of the work, or the termination of this agreement, final measurements will be made, and the account adjusted accordingly.

3. The Division officer or any officer of the Public Works Department of the Government of Madras duly authorised in this behalf by such Division officer may put an end to this agreement at his option at any time and, in the case of bad work or material, such Division officer or any such other officer as aforesaid so authorised may remove the same and have it replaced, deducting the value of the work rejected or material removed of the cost of replacing the same, as he may think proper, from any amount due or that may become due to the party making this tender.

4 Such Division officer or any such officer so authorised as aforesaid may fine the piece-worker any amount for slow progress of work.

5. Five per cent. of the value of work done may be deducted from each payment made, until the completion of the work, as security for the due fulfilment of the above conditions which security may be forfeited, in whole or in part, at the discretion of the Division officer, if, in his opinion, the party making this tender has failed to fulfil all or any of the conditions. This deduction will be restricted to agreements of above Rs. 200

Date 2nd February 1909.

Witnesses { 1 (Sd) R. Foulkes.
2* (Sd) R. Duraisami ayyar.

Signature of the party making the Tender. } (Sd) Mitchell & Hockin 2/2/09.

Residence Tekkadi

Accepted by me.

(Sd) R. Decharzel
3/2/09
Executive Engineer
Madura Division

(True Copy) M. Brown
20.10.09
Executive Engineer
Madura Dn.

T.S.K. 18/10/09

* Second witness is required with reference to Chief Engineer's P.W.D. Memo. No. 2590 C., dated 9th June 1900.

R 20.x.09

80,000—6-9-07.

SBD 18.10.09

14

P.W.D., Irrigation.

Note by the Chief Engineer
for Irrigation.

flag S

In G.O., No. 119-I., dated 12th March 1907 an estimate, amounting to - Rs. 1,00,000 for works or Rs. 1,23,000 including establishment, for widening and deepening the watershed cutting - from the Periyar lake at Thekadi, was - sanctioned and work to the value of about Rs. 24,000 was executed during 1908-09.

Pages 1 & 7 of cur file.

2. In his letter No. 73 C.E., dated 23rd January 1909, the Superintending Engineer, VI Circle brought to the - notice of the Chief Engineer for Irrigation, that the Executive Engineer, - Madura Division, reported that the work could not be done at all without -- raising the rates considerably and that he recommended that the work be entrusted to Messrs Mitchell & Hockin of Coolasagaram of South Travancore who agreed to undertake ~~the work~~ it at certain rates at which even the local piece-workers were not ~~inclined~~ prepared to do ~~the work~~ it but demanded still higher rates. The Supg. Engineer further reported that he approved of the Ex. Engineer's proposal as it was considered it advisable to entrust the - work to the above Firm. The Supg: - Engineer's action was accordingly --

2/ 15 18P

page 8 of cur file

accordingly approved and a revised -- estimate called for in this office Memo No. 399 dated 4th February 1909.

3. With his letter No. 68 C.E., dated 19th January 1910, the Supg. Engineer now submits a revised estimate amounting to Rs. 2,03,800 for the work showing an excess of Rs. 1,03,800 over the original estimate for "works".

page 10 to 12 of cur file

4. The difference between the original and revised estimates as ascertained from the comparative statement is shown below by sub-heads.

	Original	Revised	Difference.
1. Widening and deepening the watershed cutting.	77,570	1,58,737	+ 81,167
2. Ring bund, baling and unforeseen works.	3,590	16,588	+ 12,998
3. Sheds for workmen &c.	..	5,713	+ 5,713
4. Blocking up the curved passages.	10,000	10,176	+ 176
5. Depreciation value of Tram line.	..	4,000	+ 4,000
6. Contingencies and Supervision	7,640	7,796	+ 156
7. Removing the existing revetment and stacking.	1,200	790	- 410
	1,00,000	2,03,800	1,03,800
29	8	8	9

Of the excess of Rs. 81,167 under item No. 1, a sum of Rs. 25,144 is due to wrong classification of the nature of soils when the original estimate - was framed; Rs. 20,073 is due to extra cutting found necessary on account of the differences found in the levels of the watershed cutting originally taken when compared with those taken just -

3/ 16 19P

just before the work was started and Rs.35,950 is due to increase in rates.

Excess under item No.2 is due to the lump sum provision made for baling, ring bund &c in the sanctioned estimate being found quite inadequate to meet the actual requirements on account of the damages caused by the unexpected cyclonic rainfall in May 1909.

Excess under item No.3 is due to provision made for sheds and cooly lines which were omitted in the sanctioned estimate, having been found necessary in the course of the execution of the work.

Excess under item No.5 is due to payment of the depreciation value to the extent of Rs.4,000 for the tramway lines and waggons obtained from the Kistna Eastern and Nellore Divisions for the quick removal of the blasted stuff ~~as found necessary and included accordingly in the revised estimate~~.

The difference in the remaining items call for no special remarks.

Difference in levels. It ~~is~~ may be ~~observed~~ noted that as the bottom and sides of the cutting are very rough, it is difficult to take accurate levels and that part of the difference is also due to spoil and debris having fallen ~~from the ground surface~~ into the cutting since the original levels were taken.

6

4/ 17 208

<u>Difference in classification of</u> - soils. ~~It may be stated that~~ Owing to the very variable nature of the sub-soil of the cutting, it was ~~practically impossible~~ difficult to make ~~an accurate~~ a correct classification of the soils beforehand.

<u>Increase in rates</u>. The price of ~~the~~ labour has gone up considerably in recent years and the increase now provided appears to have been unavoidable. The amount of the revised estimate has been increased in this office from - Rs. 2,03,800 to Rs. 2,04,300 for "work owing to errors found in the calculati of cutting and widening. In spite of the large excess, however, the work is still quite worth executing and the revised estimate, as altered in this office, is therefore recommended for sanction.

5 As the water has fallen sufficiently low in the lake, arrangements have been made to go on with the work in anticipation of sanction to the revised - estimate and it will, it is hoped, be fully completed during the current - working season.

M 6.4.10

9/4/10

7

1,000—26-5-03.

P.W.D., IRRIGATION BRANCH.

Subject :—

18

NOTES

CONNECTED WITH

G.O., No. I., dated 190 .

Notes edited.

Initials of the Clerk.

NOTES.

PUBLIC WORKS DEPARTMENT.

(Irrigation Branch).

19

(Current No. 682)

Widening & deepening the water shed cutting of the Periyar lake.

pp1-7 c.f. From the Supg. Engineer, VI Circle, No.73 C.E., dated 23-1-1909.

D.I.

flag-R

In G.O., No.1,200 I, dated 22nd December 1906 two estimates (1) for ₹90,000 for widening and deepening the watershed cutting and the other for ₹10,000 for blocking up the curved passes and driving a heading through the island in the Tunnel leading from the Periyar lake were approved and forwarded to the Government of India for sanction.×

× The Govt of India accorded their sanction in letter No 3253 / 5.3.07 printed in G.O. 1193 / 12.3.07 flag S.

2. The Supg. Engineer now forwards a copy of Madura Executive Engineer's report dated 19-1-09 from which it would appear that the work on the 1st estimate cannot be carried out without raising the estimated rates very considerably and that the rates to which Messrs Mitchell & Hockin agree to undertake are (pp3-4 c.f.)

·×· p6 c.f.

⊗ p5 c.f.

1. Hard rock ₹125 per 1000 c.ft. against the sanctioned rate. ---------------- ₹90 ⊗
2. Soft rock. ₹50 -----------do------- 35
3. Gravel. ,, 15 ----------do------- 10
4. Hard earth ,, 8 ----------do------- 5

The Executive Engineer has also attached a statement of the value of work done according to the estimated rates up to the end of November/08 but states that the local piece workers complained that they had lost money and demanded much higher rates than even the ones which Messrs Mitchell & Hockin now ask for. (p7 c.f.)

3. In para 5 of the Executive Engineer's report, it is stated that even with these higher rates the estimate is not likely to be exceeded much as the proportion of hard and soft rock has been over estimated and that there is a much greater proportion (p4 c.f.)

of earth in the cutting than that given in the estimate.

p 2 c.f. 4 The Supg. Engineer states that he has approved the Executive Engineer's proposal to entrust the work to Mr. Hockin and has directed him (the Ex.Engineer) to submit a revised estimate as soon as possible.

5. Orders are requested if the Supg. Engineer's action may be approved and he be asked to expedite the submission of the revised estimate.

[illegible] 28.1.09 [illegible] 28.1.09

[illegible] 29/1/09.

[illegible]

The S.E.'s action may be approved but ask him to send us data for the original rate & also for those to be paid to Messrs Mitchell & Hockin showing clearly the initial rate & lead & lift in both cases. Also state that it is presumed that for these rates Messrs M & H will guarantee to complete the work in time for the next [illegible] season

[illegible] 30/1/09

C.C. [illegible] Draft [illegible] kept below for appl [illegible] 30/1/09

E.I.'s remarks on B. Form Progress Report No. 166 widening & deepening the watershed cutting between Periyar lake & Tunnel.

N. E. I.

Was not a revised est[imate] received a few months back for widening & deepening the Periyar Watershed Cutting.

If so what has become of it

[initials]
19/12

R K

SAV
File is herewith. No revised estimate for this work has been received in this section. Estimate not recd. [initials]
x Ref. Please say if necessary a reminder [illegible] 20/12/09

21

E.I.

Please see S.E.'s letter No. 73 C.S. of 23.1.09 (pp 1-9 c.f.), this office memo: 399/4.2.09 (p 8 c.f.) & the notes in the file.

The revised estimate for the work has not been received from the S.E. VI, but the E.E. Madura Division (Mr Brown) stated in the B. Form Progress report (29.10.09) that the revised estimate for widening & deepening the watershed cutting between Periyar lake & tunnel was submitted to the S.E. with his No. 1064 S.E./23.10.09.

S.a.V. 21.12.09. [signature] 21/12/09

Send a reminder to the S.E.

[initials]
21/12/09

D.C.

A draft reminder is put up

[signature] 22.12.09. [signature] 22.12.09

[signature] [illegible]

22

p 9 c.f. To the S.E. VI Roc. 3324 d/ 22.12.09
-10-12- From do No. 68 C.S. d/ 19.1.10.

D.I

Orders are requested, if the revised estimate, which exceeds the original by 103 o/o may be checked for sanction. In this connection reference is requested
p 4 c.f. to para 5 of the E.E.'s letter & pp 1-2 of the Notes.

[signature] 25.1.10
25.1.10

Check est. & P.I. sub.
[signature]
25.1.10

23

C... IN
By Post

Note for His Excellency the Governor.

The file relates to the widening and deepening of the Periyar Watershed Cutting.

The excess over the sanctioned estimate is very large being Rs.1,04,300, but the conditions of the work are somewhat unusual, and there were certainly difficulties in the way of making an accurate estimate, especially as regards quantities and classification of soil.

The cutting is generally under water and access to it is only possible when the lake has fallen sufficiently to enable the cutting to be cross-bunded. I think therefore that as regards inaccurate quantities and classification of soil, the officer who prepared the original estimate (Mr. DeChazal) may be absolved from blame.

As regards rates those now found necessary are very high and I must say that I did not at all anticipate the necessity for such a large increase.

The fact however remains that no one would look at the work for lower rates, the pieceworkers who started the work in the first season having all lost money over it.

Under the circumstances it is necessary to accept the high rates and I have allowed the work to go on.

The estimate ought I think to have been sent in a good deal earlier, but I have not called for any explanation because as His Excellency will no doubt remember, the extra Executive Engineer for Madura Division has only recently been appointed and Mr. Brown had far more work during the past 12 months than he could manage.

The

CHIEF ... ER
FO ... ON.
15 APR 1910
No.

The draft order sending the estimate to India for sanction is submitted for approval.

AS
9/4/10

Approved
[signature] 12.4.10

I

Submitted that the draft order may now issue.

[signature] 15.4.10 15.4.10

[signature]
15/4/10

C No 3324 of '09

CURRENT No. 3941
PASSED ON BY 16/4/1910
P. C.
U. R. C.
RE.
R. K.
D. O.

SUBJECT:— Revised estimate for widening and deepening the water shed cutting from the Periyar lake at Thekkady

PUBLIC WORKS DEPARTMENT,

IRRIGATION BRANCH. 25

Urgent

PROCEEDINGS OF THE MADRAS GOVERNMENT.

READ the following

Reg 5 G.O.No. 119-I, dated 12-3-07 1 Sh.

Read also

Print

From the Supg.Engineer VI Circle dated 23-1-09 No.73 C.E.
To - - - 4-2-09 No.399
To - - - 22-12-09 No.3324
From - - - 19-1-1910 No. 68 C.E.
Note by the Chief Engr: for Irrign 9.4.10. #

Print Report and Comp. Statt

21 P

Order No. 118 Irrg 19.4.10

The revised estimate amounting to Rs.2,04,300 for works or Rs.2,51,289 including the charge for establishment for widening and deepening the Periyar watershed cutting is approved and will be forwarded to the Govt.of India for sanction.

12.4.10

2. The following letter will be sent to the Govt.of India.

To No. 119 Irrg 19.4.10.

The Secretary to the Govt.of India
P. W. D

To the Chief Engr for Irrgn
" Supg. Engineer, VI circle
" Examiner, P. W. Accts

Desp 31/5/10

Sir,

I am directed to forward herewith a copy of the Proceedings of this Govt. No. 118 I dated 19.4.10 together with the revised plans and estimate amounting to Rs.2,51,289 --

2

2/

26 27

including the charge for establishment for widening and deepening the Periyar watershed cutting and to request that the Govt.of India may be pleased to accord their early sanction to the - estimate.

9/4/10

Desp 11/4/10

Documents accompanying

Copy of the Proceedings referred to

9.4.10

27

23

1084—10-4-10.

Subject:— Sediment —

P.W.D. Irrigation Branch.

28

NOTES

CONNECTED WITH

G.O., No. 118-I. dated 19-4-1910

Widening & deepening Tenga Wali Shed Cutting

Notes edited.

Technical NOTES.

PUBLIC WORKS DEPARTMENT.

(Irrigation Branch).

(Current No. 3324 of 09. dated 21-1-10.

Vide page 10 of Cur file

The S.E. VI Circle submits a revised estimate for widening and deepening the watershed cutting from the Periyar lake at Thekadi.

	Rs.
Amount of the revised estimate for works	2,03,800
Amount of the original estimate sanctioned in G.O.No. 119-I.,d/ 12-3-07 for works	1,00,000
Excess over the original estimate ..	1,03,800

Vide flags R & S

The difference between the original and the -- revised estimates as ascertained from the comparative statement is shown below by sub heads.

	Original	Revised	Difference
1. Widening & deepening the watershed cutting.	77,570	1,58,737	+ 81,167
2. Ring bund baling and unforeseen works..	3,590	16,588	+ 12,998
3. Sheds for workmen &c.	..	5,713	+ 5,713
4. Blocking up the curved passages.	10,000	10,176	+ 176
5. Depreciation value of Tram line.	..	4,000	+ 4,000
6. Contingencies and supervision. ..	7,640	7,796	+ 156
7. Removing existing revetment amd stacking.	1,200	790	- 410
	1,00,000	2,03,800	1,03,800

Wrong classification 25144
Extra in rates 36950
61094

Of the excess of Rs. 81,167 under item No. 1, a sum of Rs. ~~[illegible]~~ 61094 is partly due to increase in the - rates , as the rates allowed in the original estimate were found inadequate during execution, and partly due to wrong classification of the nature of the soils when the

when the original estimate was framed; a sum of Rs. 20073 is due to extra cutting found necessary on account of the differences found in the levels of the watershed cutting originally -- taken, when compared with those taken just before the work was started, as can be seen from the L.S.

Excess under item No.2 is due to the lump sum provision made for baling, ring bund &c., in the sanctioned estimate being found quite inadequate to meet the actual requirements on -- account of the damages caused by the unexpected cyclonic rainfall in May 1909.

Ecess under item No.3 is due to provision - for sheds and cooly lines, which were omitted in the sanctioned estimate, having been found -- necessary in the course of the execution of the work.

Excess under item No.5 is due to payment of the depreciation value to the extent of Rs.4,000 for the tram way lines and waggons obtained from the Kistna Eastern and Nellore Divisions for the quick removal of the blasted stuff as found necessary and included accordingly in the revised - estimate.

The differences in the remaining items call for no special remarks.

(4)

Vide plate A

In the revised Longl section of the watershed cutting now submitted the levels on which the original estimate was framed and those taken just before the work was started are shown, from which, it will be seen that the levels taken just before starting the work are generally higher and in

31

in some places they are more than 3½ feet above the old bed levels. The names of the subordinate who took and checked the original levels are not known. Even in the revised longl: section, only the name of the overseer who took the levels has been noted but not the name of the subordinate who checked the levels. It is not clear whether the revised levels were checked by any body. It is clear from the comparative statement that the extra quantity of cutting and widening on account of the incorrect levels amounts to 294 units. It is also clear that part of the excess under item No. 1 is due to the incorrect classification in the nature of soils to be excavated when the -- original estimate was framed. The persons -- responsible for these inaccuracies are not mentioned anywhere.

Original plans are put up in the portfolio.

Vide plate A

Vide page 15 of the estimate file flagged K.

The Supg. Engineer was asked in this office Memo No. 399 dated 4th February 1909, to submit detailed data for the original as well as the revised rates. It is stated now that no detailed data are available for the original rates while those allowed in the revised estimate are based on actual observations made while the work was in progress. The data of observations submitted do not give any details at all as regards initial rate, lead, lift &c., but only show the number of coolies employed for 1 unit of work the wages - being taken at Rs. 0-8-0 per cooly.

page 8 of cur file

Vide page 4 of the estimate file flagged K

It is stated in para 3 clause 3 of the -- report that a side slope of 1½" or ⅛' to 1 ft has been given to the cutting against the vertical - sides originally allowed. This has not been shown on the cross sections now submitted nor taken into

page 2 of the report flag K

into account in calculating the area of the cutting.

No detailed estimate has been submitted for the quantities of work already completed and -- shown in Col. 5 of the comparative statement -- under items 1 to 4 but some of the revised cross sections show the extent of work already done. The sanctioned bed-width for the cutting is 35 ft throughout while the revised cross sections submitted show bed-widths varying from 18 to 25 in the portion from 0 to 700 feet of L.S. commencing from the head sluice. But in a foot-note in -- plate B it is stated that the C.S. show only the widths of cutting actually worked out already and that owing to steep sides the full sanctioned width of 35 feet could not be plotted. But in the estimate, detail quantities of work to be done for widening the cutting upto the full width of 35 ft have been given from actual measurements; vide remarks in margin of page 9 of Detailed estimate. These quantities, being actual measurements not shown in the section, could not be checked.

page 15 of the estimate file flagged K

vide plate B

The amount of the estimate as checked in - this office has been increased from Rs. 2,03,800 to Rs. 2,04,300 owing to errors found in the calculations of cutting and widening.

E I

For orders

The est may be passed for sanction - Please see last para p. 3 of the report. With regard to the rates please see p 3 of c.f. et seq - p 6.

19.3.10

18/3/10

Flag K -

26.3.10

33

T. of Phaw See page 2 of the Report & p. 5 of the same. What is the excess due to the wrong Classification only apart from the excess due to extra rates. Rs. 25,144.

D.E.I.

The statement given on page 5 and the comparative statement of differences go- show that as per revised Estimate there is a saving of 222 units under item (1)

Vide Comparative Statt

— do —	54 units	— do —	(2)
— do —	373 units	— do —	(3) & (6)
Total	649 units	— do —	(1), (2) & (3) & (6)

as against an excess of 570 units — do — (4) & (5)

and an excess of 379 units under the new item (7)

Total 949 units under item (4) (5) & (7)

The difference between the two totals represents the net excess of 300 units in cutting — and 649 units represent the quantity affected by wrong classification. It is not possible to state exactly, in the absence of further details as to in what items the change in the classification occurs. If it is presumed

Details for the work already done is not available.

that the 373 units of saving under the item of soft rock are accounted for by a correspond excess under the item of hard rock and the remaining quantity of 276 units of

3X

saving under items (1) and (2) are accounted for by a corresponding increase under item (7) then the excess due to wrong classification works out as follows:-

222 units of item (1)	@ Rs 5/- per unit		Rs 1110/-
54 — do —	(2)	10/-	Rs 540/-
373 — do —	(3)	35/-	Rs 13055
		Total	Rs 14705

373 units of hard rock @ 90/- per unit ⊗		Rs 33570
276 — do — of item (7) @ 22/12/- do —		6279
	Total	Rs 39849

⊗ Old rate has been taken as the revised rate will be accounted for under excess due to increase of rates.

I ∴ Excess due to wrong classification is Rs 25144/-

Excess due to 300 units of extra cutting owing to wrong levels of which 197 units are in hard rock and 103 units are under item (7)

197 units of hard rock @ 90/- per unit ⊗		Rs 17730
103 units of item (7) @ 22/12/- do —		2343
	Total	Rs 20073

II ∴ Excess due to extra cutting found necessary owing to mistake in levels } Rs 20073.

The total of excess I & II = Rs 45217:

But the total excess is Rs 81167 Rs

III ∴ Excess due to increase in rates is 35950

M 31.3.10

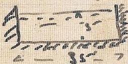
2. I. So far as the excavation in the Wakis shed cutting only is concerned the excess

is due to the following causes
1) Wrong Classification - 25,144 R
2) " levels - 20,073 "
3) Increased rates - 35,950 ~~46,247~~ "
87,167 R.

With regard to reducing the width of the cutting — during low water even with 35' bed width & 1' fall the cutting will not discharge the same quantity as the channel for the same depth —

Take the case of the channel discharging with only 3' depth - fall 1 in 75
d = 316 cusecs n = .03 -

So the cutting on more excavation bottom width 35' slope 1' per mile a depth of 5', & taking n = .0225 as in the estimate, will only give a discharge of 397 cusecs — or abt = that of the channel discharging 3' — After the widening has been carried out the velocities & levels at all stages may be observed & see if further widening is necessary.



This est may be pre ~~checked~~ & passed for sanction

1. 4. 10.

Yes I think it is clear that although the 35 ft cutting does not help much when the tunnel is discharging full it is none too much for effectively drawing off below this level & no modification is therefore desirable

As regards the difference in levels & classification it may be explained in the E.E's note that as the bottom & sides of the cutting are very rough it is difficult to take accurate levels & part of the difference is also due to spoil & debris having fallen from the ground surface via the levels being taken later

Also owing to the very variable nature of the soil rock of the cutting it was practically impossible to make an accurate classification of soils before hand

As regards rates the price of labour has gone up considerably in recent years & the increase now proposed appears to have been unavoidable

In spite of the large excess however the work is also quite worth executing & the revd estimate is therefore recommended for sanction.

As the water has fallen sufficiently in

At least arrangements have been made to go on & complete the work in anticipation of sanction to the revised est. and it will it is hoped be fully completed during the current working season.

Complete E.I.'s Note & draft order accordingly as soon as possible.

[illegible]
5/4/10

J.E.I.

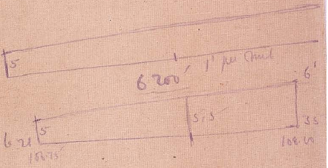
E.I.'s note has been completed and the file is sent for preparing the draft order as soon as possible & submitting the same to D.E.I.

[illegible]
6.4.10

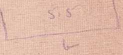
The draft order & letter to India should be completed without further delay.

[illegible]
9/4

Total length of Wale
[illegible] culling - 6200' 36

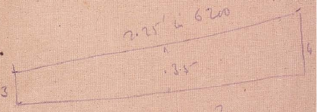


To discharge 662.4 Cusecs



114.60
111.75
2.25

108.75
5
111.75

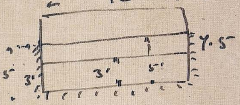


D = 776 Cusecs -

Av. 0.3

39

Tunnel has a section at area of



Fall. 1 in 75 —

Calculate discharge — cusecs 662

for depths of 5' & 3' — 316

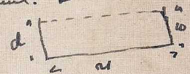
taking n = .03

Area of tunnel = 90 □'

discharge = 1100 cusecs

$V = \frac{1100}{90} = 12.2'$ per sec.

Channel. ~~10~~ 21' wide 10' deep



n = .03 —

Find surface slope required to give V = 12.2' per 1"

a) ~~10'~~ d = 10'

b) ~~8~~ d = 8'

c) ~~[illegible]~~ =

Area of tunnel 80 □'

12 x 7.5

80 0

82 6

80 □'

80) 11.00 (12.2' per sec

9

20

18

2

head 1'

---

1) What would be the discharge of the tunnel running 3 ~~4~~' deep - not under pressure -

+ 5' deep -

For 12.2' per sec velocity depth 10' & bed width 21' -

1)
This proposal of making the tunnel w. slid cutting of 55'

Already - channel 25 to 26' has been cut + 3' depth more has the cut -

---

Cill of Hd. Sluice at entrance of tunnel = 106.75

D = 1,100 cusecs.

Depth 10' = height of tunnel.

Fall 1' per mile -

Area of tunnel 8×8 = 80 □'

highest point of water ghw cutti now will be + 108.00

1.25 - length 1¼ m

original 115.21

Area of tunnel = 80 □'

head 1! v = 5.

$v = \frac{5}{8}\sqrt{h+h_a}$

88 / 1110 (14'
8
30
32
14' per sec -

v =

$7 = 5\sqrt{1+h_a}$

$\therefore \sqrt{1+h_a} = 3.$

$1+h_a = 9$

$h_a = 8.$

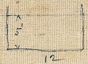
$v^2 = 2gh$ 48

$v^2 = 64\times8$ 3

$v = 512$ (?)

M

I



Area = 12 × 5 = 60 sft.

R = $\frac{60}{22}$ = 2.72

√R = 1.651

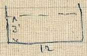
S = 1 in 75 ; √S = .11547 . N = .03

C√R = 95.65

V = 95.65 × .11547 = 11.04.

Disch = 60 × 11.04 = 662.4 cusecs.

II



a = 36

R = 2 √R = 1.41

√S = .11547

C√R = 76.01

V = 76.01 × .11547 = 8.78

Discharge = 36 × 8.78 = 316 cusecs.

III.

N = .03 ; Disch = 1100 cusecs.

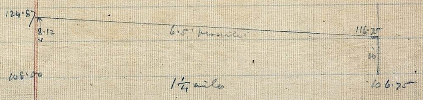
A = 21 × 10 = 210 sft. V = $\frac{1100}{210}$ = 5.24 ft per sec.

R = $\frac{210}{41}$ = 5.12 ; √R = 2.26

6.5 ft per mile S = 1 in 810 ; √S = .035136

C√R = 148.98

V = 148.96 × .035136 = 5.24 ft per sec.



IV

A = 21 × 8 = 168 sft. Disch = 1100 cusecs

$V = \frac{1100}{168} = 6.55$

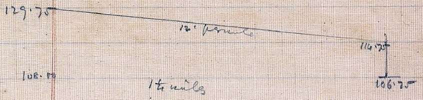
$R = \frac{168}{37} = 4.54$, $\sqrt{R} = 2.13$

$S = \frac{1}{440}$ = 12 ft per mile $\sqrt{S} = .0477$

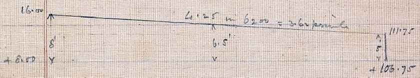
$C\sqrt{R} = 137.27$

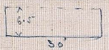
$V = 137.27 \times .0477 = 6.55$

D = 168 × 6.55 = 1100 cusecs.



V





Bed width to disch 662 cusecs.

A = 30 × 6.5 = 195 sft

Surface fall 4.25 in 6200 = $\frac{1}{1458}$. $\sqrt{S} = .0262$

$R = 4.53$, $\sqrt{R} = 2.13$.

N = .03.

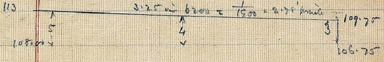
$C\sqrt{R} = 137.43$.

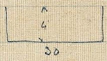
$V = 137.43 \times .026 = 3.57$

Discharge = 195 × 3.57 = 696 cusecs.

VI   Disch = 316

bed width required 30'





$A = 30 \times 4 = 120$

$R = 3.156$

$\sqrt{R} = 1.78$

$S = \frac{1}{1900}$; $\sqrt{S} = .0229$.

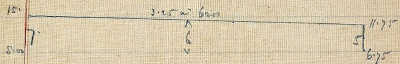
$C\sqrt{R} = 116.36$

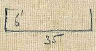
$V = 116.36 \times .0229 = 2.66$

Disch $= 120 \times 2.66 = 319$ cusecs against 316.

VII. Disch 662.

bed width reqd'





$a = 210$
$R = 4.47$
$\sqrt{R} = 2.11$

$\sqrt{S} = .0229$.

$C\sqrt{R} = 135.71$

$V = 135.71 \times .0229 = 3.10$

Disch $= 210 \times 3.10 = 651$ cusecs against 662

ESTIMATE FORM.—Abstract.

44

Quantity.	Description of Work.	Rate.	Per.	Amount	Total.
1	2	3	4	5	6
		Rs.		Rs.	Rs.
	Widening and deepening the water-shed cutting of the Periyar lake.				
676000	Excavation in Hard Earth.	5	cft 1000	3380	
301000	Do. in Gravel & Boulders.	10	Do.	3010	
694000	Do. in Soft Rock.	35	Do.	24290	
521000	Do. in Hard Rock.	90	Do.	46890	
60000	Removing the Existing revetment and stacking the materials	2	100	1200	
	Charges for ring bund baling and unforeseen works.		L.S.	3590	
	Contingencies	—	—	5395	
	Petty Supervision	—	—	2245	
	Total				90,000
	Blocking the curved passages and driving ahead through the island in the Tunnel leading from the Periyar lake.				
6327 cft	Tunnelling in Hard Rock.	100	100 cft	6327	
1958 cft	Random Rubble in Surki mortar.	30	do.	587	
425 sft	Pointing with Cements.	7	100 sft	30	
	Straightening the masonry of the old Gates to make a straight line		LS.	200	
	Baling Charges		LS.	200	
	Unforeseen works.			2000	
	Contingencies			415	
	Petty Supervision	—		241	
	Total				10,000

Sanctioned in G.O. No. 11 P.W.D. (Govt's letter No. 3253 / 5-3-07) 12-3-07

Grand Total of Estimate Rs. 100,000

Compared 94 No. 18/10/09 STATION ______ Date ______ 190

(True copy) M. Brown 21/10 Exe: Engr Madura Dn

C. A. Smith 10/12/06 Chief ~~Executive~~ Engineer. Irrigation

5468
25 OCT 1909
SIXTH CIRCLE

F 32.
80,00 —10-9-08.

CHIEF ENGINEER FOR IRRIGATION.
21 JAN 1910

Circle— IV

Division— Madura

District— Madura.

Taluk (or Estate in case of Estate Works).

Travancore.

ESTIMATE FORM.—Abstract.

Financial Head—Imperial Irrigation

Budget Head—4 ¶ - Open Capital - accounts not charged to Revenue.

Departmental Head— 1 - works.

Main Head— 1. Head-works.

Sub-Head— 2 Earthwork.

Project of which the work forms part— Periyar.

Section—

Name of Work— I Widening & deepening the water shed cutting of the Periyar lake
II Straightening the Tunnel of Periyar lake.

Amount of Estimate, Rs. 1,00,000

To be carried out by— P.W.D.

REFERENCES.

Register No. 376 / 06-09

Copy of the Sanctioned Estimate

G 30/3941/C Rec.

E. No. 28.
50,000—7-9-07.

ESTIMATE FORM.—Detail Measurements. 45

Detail of Work.	Number.	Measurements in Feet. Length.	Breadth.	Depth.	Area or Contents.	Total Quantity of each description of work.
1	2	3	4	5	6	7
Straightening the Tunnel of Periyar lake.						
Tunnelling in Hard Rock.	1	aver. 38	(x) 187 + (x) 146 / 2		6327	appr. x areages no. 3 (x) do do 11
Total Tunnelling in Hard Rock c.ft. —						6327.
Random ~~Coursed~~ Rubble in Surki mortar						
Blocking at A.	1	14	6¾	10	945	
do at B.	1	15	6¾	10	1013.	
Total Random rubble in Surki mortar cubic ft.						1958
Pointing with Cement.						
Sides of Block A & B.	1	42	10	x	420	
Total Pointing in Cement sq. ft.						420.
Straightening the Masonry of old gates to make straight line lump sum Rupees -						200.
Baling charges lump sum rupees.						200.
Unforeseen works Lump Sum Rupees						2000

B[illegible]
[illegible] Examined by
[illegible]
18/10/09

ESTIMATE FORM.—Detail Measurements.

Detail of Work.	Number.	Measurements in Feet.			Area or Contents.	Total Quantity each descripti[on] of work
		Length.	Breadth.	Depth.		
1	2	3	4	5	6	7

Original Estimate

E. No. 28.
30,000—7-9-07.

46

ESTIMATE FORM.—Detail Measurements.

ENGINEER'S OFFICE
OCT 1909
... CIRCLE

Detail of Work.	Number.	Measurements in Feet. Length.	Breadth.	Depth.	Area or Contents.	Total Quantity of each description of work.
1	2	3	4	5	6	7
Widening and deepening the watershed cutting of the Periyar lake.						
Removing the Existing revetment and Stacking the Materials.						
	10	100	20	3	60000	
Total removing the revetment etc Cub ft.						60,000.
Charges.						
For Raising bund, Baling and unforeseen works						LS Rs 3590.

T.E.
[illegible]

Compared by
[illegible]
18/10/09

(Sd) S. B. Murray
Superintending Engineer
N Circle.

ESTIMATE FORM.—Detail Measurements.

Detail of Work.	Number.	Measurements in Feet.			Area or Contents.	Total Quantity of each description of work.
		Length.	Breadth.	Depth.		
1	2	3	4	5	6	7

ESTIMATE FORM.—Calculation Sheet.

Widening and deepening the water...

Number of Section.	Area of present Section.	Area of proposed Section.	Difference	Mean Area.	Length.	Cubical Contents.	Remarks.
1	2	3	4	5	6	7	8
			Hard Earth				
0. to CS No. 3			271	271	350	94850	
				303	200	60600	
4			335				
				321	200	64200	
5			307				
				312	200	62400	
6			317				
				309.5	200	61900	
7			302				
				344.5	200	68900	100 34450
8			387				378400 — with 34450 taken into consideration 34450 412850
				193.5	200	38700	
9			--				
				1.00	200	200	
10			2.00				
				1.00	200	200	
10A			--				
				2.00	200	400	
11			4.00				
				2.00	200	400	
12			--	-	-	-	
13			--	-	-	-	
13A							
				22	200	4400	
14			44				
				22	200	4400	
15			--	--	--	--	
			Carried over		—	461550	

[E. No. 29.]
20,000—6-9-07.

To be employed for all earth-work (Tank and Channel) estimates when sectional measurements are used and when the quantities are not taken out direct.

Estimate Form.

Calculation Sheet of Cross Sectional Areas and Contents of Earth-work.

To accompany the detailed Estimate No.
of 190 -190 , for *

* Here enter the name and description of work in full.

ESTIMATE FORM.—Calculation Sheet.

48

Number of Section.	Area of present Section.	Area of proposed Section.	Difference.	Mean Area.	Length.	Cubical Contents.	Remarks.
1	2	3	4	5	6	7	8
	Brought forward				—	461550	
15		..	—				
				35	200	7000	
16			70				
				35	200	7000	
17			—				
			Total cutting Cubft.			475550	
Clearing approaches.							
			2000 × 20 × 5			200000	
	Total hard earth Cft					675550 cft	
				Say		—	676 units
	Gravel and Boulders.						
8.			—				
				196.5	200	39300	
9			393				
				196.5	200	39300	
10			—				
14			—				
				366.5	200	73300	
15			733				
				366.5	200	73300 ~~1800~~	
16			—				
				9	200	1800	
17			18				
				9	200	1800	
18			—				
				Carried over			

228800

STATION,

Dated 190 .

~~Executive Engineer~~,

~~Division.~~

ESTIMATE FORM.—Calculation Sheet.

Number of Section.	Area of present Section.	Area of proposed Section.	Difference.	Mean Area.	Length.	Cubical Contents.	Remarks.
1	2	3	4	5	6	7	8
		Soft Rock.					
9			—				
				125.00	200	25000	
10			250				
				258.5	200	51700	
10A			267				
				296.0	200	59200	
11			325				
				325	200	65000	
12			325				
				298.5	200	59700	
13			272				
				280.0	200	56000	
13A			288				
				281	200	56200	
14			274				
				137	200	27400	
15			..				
				156	200	31200	
16			312				
				297.5	200	595.00	
17			283				
				301	200	60200	
18			319				
				298	200	59600	
19			277				
				276	200	55200	
20			275				
21			nil	137.5	200	27500	

Total cutting in Rock. 693.400 or say 694.800 units

STATION,

Dated 190

(Sd) S. B. Murray

~~Executive Engineer~~, Supdg. Engineer,

~~Division.~~ Sixth Circle

ESTIMATE FORM.—Calculation Sheet.

Number of Section.	Area of present Section.	Area of proposed Section.	Difference	Mean Area.	Length.	Cubical Contents.	Remarks.
1	2	3	4	5	6	7	8
		Gravel and		Boulder (Continued)			
				Brought forward		228800	
18			..				
				4	200	800	
19			8				
				25	200	5000	
20			42				
				46	200	9200	
21			50				
				43.5	200	8700	
22			37				
				34	200	6800	
23			31				
				63.5	200	12700	
24			96				
				52.5	200	10500	
25			9				
				21.5	200	4300	
26			34				
				31.5	200	6300	
27			29				
				27	200	5400	
28			25				
				12.5	200	2500	
29			..				

Total cutting in Gravel Boulder.

Cubic feet — 301000 or

Say — 301 units

[illegible]

[E. No
20,000—6-9-07.

To be employed for all earth-work (Tank and Channel) estimates when sectional measurements are used and when the quantities are not taken out direct.

Estimate Form.

Calculation Sheet of Cross Sectional Areas and Contents of Earth-work.

To accompany the detailed Estimate No.

of 190 –190 , for *

* Here enter the name and description of work in full.

ESTIMATE FORM.—Calculation Sheet.

Number of Section.	Area of present Section.	Area of proposed Section.	Difference	Mean Area.	Length.	Cubical Contents.	Remarks.
1	2	3	4	5	6	7	8
		Hard Rock					
21			276	138	200	27600	
				287	200	57400	
22			298				
				288	200	57600	
23			278				
				306	200	612.00	
24			334				
				307.5	200	61500	
25			281				
				285	200	57000	
26			289				
				246	200	49200	
27			203				
				242	200	48400	
28			281				
				323	200	64600	
29			365				
				182.5	200	36500	
End							

Total Cutting in Hard Rock cft - 521000 or
Say — 521 units

Chk
Compared by
Hs
18/10/09

(Sd) S. B. Murray
Supdt. Engineer
VI Circle

To be employed for all earth-work (Tank and Channel) estimates when sectional measurements are used and when the quantities are not taken out direct.

Estimate Form.

Calculation Sheet of Cross Sectional Areas and Contents of Earth-work.

To accompany the detailed Estimate No.

of 190 -190 , for *

* Here enter the name and description of work in full.

52

18 2011.5.6.